EQUITY IN SPATIAL DISTRIBUTION OF PRIMARY HEALTH CARE IN THE CITY OF MANAUS, AMAZONAS, BRAZIL

EQUIDADE NA DISTRIBUIÇÃO ESPACIAL DA ATENÇÃO PRIMÁRIA À SAÚDE NA CIDADE DE MANAUS, AMAZONAS, BRASIL

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ABSTRACT

Objective. Evaluate the spatial distribution of health services in primary care according to the characteristics of social vulnerability in the city of Manaus, Amazonas, Brazil.

Methods. Selection of the census tracts that compose each human development unit was performed, creating a geographic database. Indicators were selected for each territorial unit and two constructs of social vulnerability were predicted using principal component analysis: one crude and other weighted by the population size. Four maps were created showing quintiles distribution of the constructs, with an overlap of spatial distribution of the coverage area of the family health and oral health teams. The descriptive analyzes of each map were performed.

Results. 62.1% of the territories of the existing family health teams and 74.2% of the oral health teams were located in areas of greater social vulnerability, represented by the two worst construct quintiles. However, when considering the resident population, an increase of the teams coverage in areas of lower weighted vulnerability was observed.

Conclusion. Despite low coverage the health teams were concentrated on areas of greater social vulnerability. Considering the population distribution of the municipality would allow an even more equitable distribution of health teams regarding organizational accessibility once it is expected that an equitable geographical distribution minimize barriers to access and improve the health conditions and quality of life of the population. The differences in levels of social vulnerability must be considered when making health policies, especially in places where the healthcare territorial coverage is low.

Keywords: Health service. primary health care. spatial analysis. social indicators

Recebido em: 05/02/2018
Aceito para publicação em: 28/09/2018

RESUMO

Objetivo. Avaliar a distribuição espacial dos serviços de saúde na atenção primária segundo as características de vulnerabilidade social no município de Manaus, Amazonas, Brasil.

Métodos. Foram selecionados os setores censitários que compõem cada unidade de desenvolvimento humano, gerando uma base de dados geográfica. Indicadores foram selecionados para cada unidade territorial e dois construtos de vulnerabilidade social foram preditos por meio de análise de componentes principais: um bruto e outro ponderado pelo tamanho da população. Foram gerados quatro mapas representando a distribuição por quintis dos construtos, com uma sobreposição da distribuição espacial das áreas de cobertura das equipes de saúde da família e equipes de saúde bucal. Foram realizadas análises descritivas de cada mapa.

Resultados. 62,1% dos territórios das equipes de saúde da família existentes e 74,2% dos territórios das equipes com saúde bucal localizavam-se em áreas de maior vulnerabilidade social, representadas pelos dois piores quintis do construto. No entanto, ao se considerar a população residente foi observado um aumento da cobertura das equipes em áreas de menor vulnerabilidade ponderada.

Conclusão. Apesar da baixa cobertura, as equipes de saúde avaliadas concentravam-se em áreas de maior vulnerabilidade social. Considerar a distribuição populacional do município permitiria uma distribuição ainda mais equânime das equipes de saúde em relação à acessibilidade organizacional, uma vez que se espera que uma distribuição geográfica equitativa minimize as barreiras ao acesso e contribua para a melhora das condições de saúde e da qualidade de vida da população. As diferenças nos níveis de vulnerabilidade social devem ser consideradas no delineamento das políticas de saúde, especialmente em locais onde a cobertura territorial dos serviços de saúde é baixa.

Palavras-chave: Serviços de saúde. atenção primária à saúde. análise espacial. indicadores sociais.

INTRODUCTION

The way health services are spatially distributed, especially in primary care, is one of the fundamental conditions for the search for equity. Although equity in health, related to the determinants of morbidity and mortality, may sometimes be considered different from equity in consuming health services, they both are an expression of social inequalities. It means that, like other aspects of lifestyle related to the realm of consumption, the access and utilization of health services tend to reflect the levels of inequality existing in society (Travassos, 1997; Cirino *et al.*, 2016).

Defined in different ways, the prevailing concept is that access to health services is a dimension of the performance of health systems associated with health services delivery (Andersen, 1995; Travassos e Martins, 2004; Assis e Jesus, 2012). The use of health services is an expression of access, comprising all the direct or indirect contact with health services. The interaction of factors related to the delivery and demand of health services modulate the access and use of these services. In relation to the delivery, the physical existence of services is the main condition, from which emerge the aspects related to the geographical accessibility (location, access routes, public transportation), cultural (patterns of care and norms of conduct, acceptable or not by the population), economic (payment for services) and organizational (the way the service is organized). Regarding the demand, the main determinant of the use of services is the health state or need, expressing the perception of a problem by the users (Mendoza-Sassi e Beria, 2001; Travassos e Martins, 2004; Barata *et al.*, 2007; Barata, 2008).

All of these conditions influence the manner and amount of health services consumption. A health policy with the characteristics of the Brazilian Unified Health System (SUS) should compensate at the level of consumption the inequalities produced by the social organization, through the principles of equity, universality and integrality, The SUS should organize the provision of services

eliminating barriers between the population and health care, be they economic, social or cultural. So, considering the social vulnerability when planning and programming health care, including the spatial location of health services, is crucial to reach this goal, through a system based on equity and social justice (Munoz Sanchez e Bertolozzi, 2007; Barata, 2008; Paim e Silva, 2010).

Identifying whether services are located in the areas that present the greatest health needs can contribute to public health planning, allowing a more rational allocation of services and resources, as well as facilitating the delivery of more effective and efficient actions. The aim of the study was to evaluate the spatial distribution of health services in primary care, including oral health, according to the social vulnerability characteristics of the territory of the city of Manaus, Brazil.

MATERIALS AND METHODS

The study design was observational, exploratory.

Health service

The Municipal Health Secretariat provided information about the spatial distribution and coverage area of the Family Health Teams (FHT) for the year 2015 (RTM projection, DATUM SAD-69, Shapefile format). In addition, a list containing the primary care health facilities was checked on the health secretariat website to obtain the cadastral information and the geographical coordinates of each health unit. Information on the presence and number of licensed FHT in the health units previously identified, with or without oral health teams was collected from the National Register of Health Establishments (CNES/Datasus).

Territorial units

The census tracts that compose each Human Development Unit (HDU) in the urban area of the city of Manaus (State of Amazonas, Brazil) were identified. The Atlas of Human Development in Brazil, provided by the United Nations Development Program (UNDP) through the website www.atlasbrasil.org.br, was used to identify the HDUs. Then, the 2010 census tracts mesh of the municipality (in KML format - Keyhole Markup Language), provided by the Brazilian Institute of Geography and Statistics (IBGE), was visualized using the Google Earth® program. The two territorial meshes – census tract and HDU – were superposed to identify which census sectors compose each HDU. Then, a geographical database was constructed presenting the territorial division of the urban area by HDU.

Social vulnerability

Two indicators of social vulnerability were constructed incorporating seven social vulnerability indicators obtained from the Atlas of Human Development in Brazil, namely: 1 – Municipal Human Development Index (HDI) 2010; 2 – Percentage of householders mothers without elementary education and with underage children, in relation to the total number of mothers householders; 3 – Percentage of people in households where no one has complete elementary education; 4 – Dependency ratio (number of individuals aged 14 years or less and 65 years of age or over in relation to the remaining population); 5 – Percentage of extremely poor people (per capita household income ≤ R$70.00 per month); 6 – Percentage of vulnerable to poverty people (per capita household income ≤ ½ minimum wage); 7 – Income per capita. These data were obtained for each HDU of the urban area of the city of Manaus.

The social vulnerability indicators were constructed using the principal component analysis (PCA), which allows obtaining an empirical summary of the data set by identifying the pattern of correlations or covariance between standardized items. It generates a smaller number of new latent variables, not observed, and calculated from the items. The first indicator did not consider the HDU population size, while the second was constructed weighted by the incorporation of the population size of each HDU, imputing a greater weight to the HDUs with greater number of

inhabitants. The scores of both indicators were predicted for each HDU of the municipality. The analyzes were performed in the software Stata MP, version 14.

Data analysis

The information was consolidated in databases and imported for manipulation and analysis in the QGIS Geographic Information System, version 2.16 (Open Source Geospatial Foundation Project). Maps with the quintiles distribution of the crude and weighted social vulnerability indicators scores of HDUs were constructed. Then, the territories covered by the health teams were overlapped. Finally, descriptive analyzes of each map were carried out with the purpose of evaluating in which strata of social vulnerability the coverage areas were located.

RESULTS

A total of 186 health services with FHT were identified in the urban area of Manaus. Less than a half (n=83) had also oral health teams.

The variables used to construct the social vulnerability indicators for the 198 HDUs of the municipality are described in Table 1. In the PCA, evaluation of the eigenvalues through screeplot and Kaiser criteria evidenced the unidimensionality of the construct. The item 'per capita income' was removed due to the factorial load was lower than 0.30 and uniqueness greater than 0.50. Therefore, the social vulnerability indicator was predicted with the other six items. The model adequacy analysis using the Kaiser-Meyer-Olkin statistic improved when this item was removed (from 0.88 to 0.91), changing from good to excellent.

Table 1: Description of the indicators used in the study.

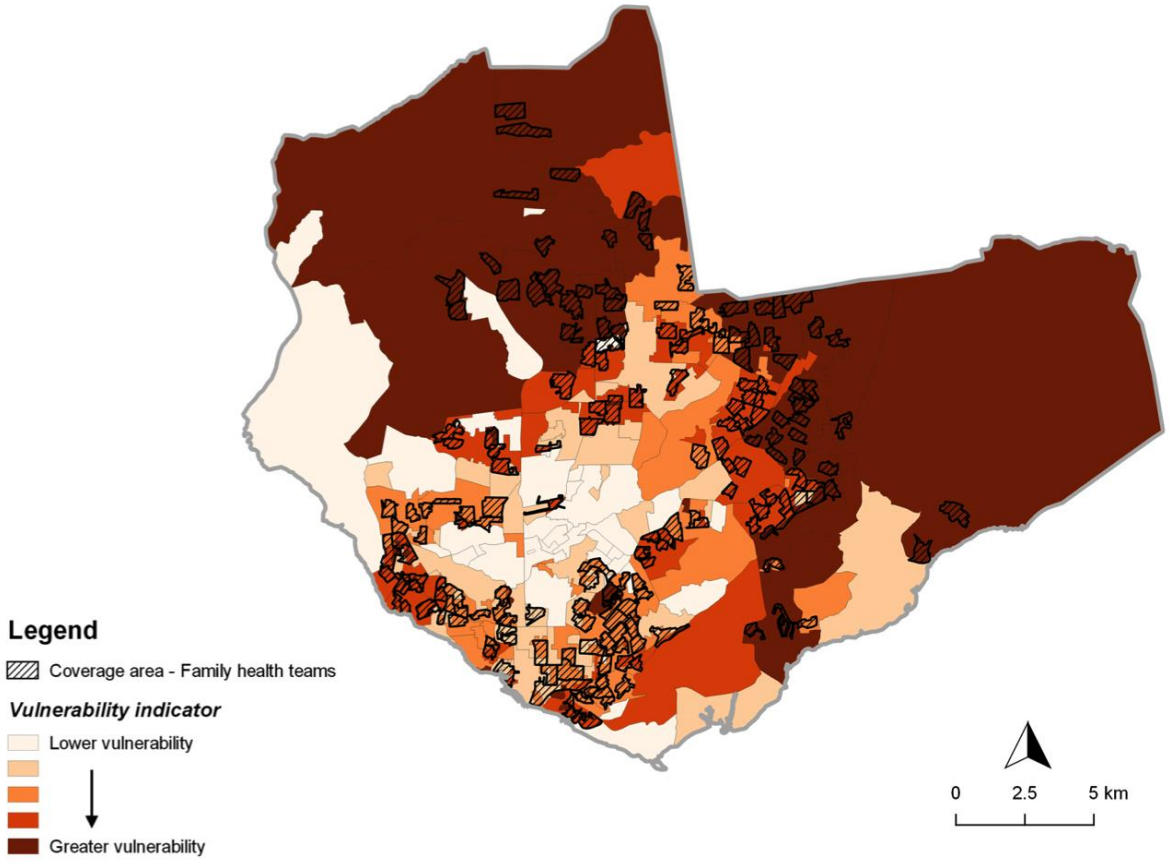
Indicator	Median	1st quartile	3rd quartile
Municipal HDI	0.762	0.676	0.859
% Householders mothers without elementary education and with underage children	11.4	2.8	22.5
% People in households where no one has complete elementary education	8.8	3.2	17.4
Dependency ratio	42.1	37.5	49.7
% Extremely poor	3.8	2.1	5.2
% Vulnerable to poverty	21.3	10.1	39.1
Income per capita (Brazilian real)	723.5	446.4	1348.9

Two maps were constructed for FHT and two for FHT with oral health teams: one presenting the crude social vulnerability indicator and one presenting the indicator weighted by the population size of each HDU. The four maps showed the strata of the social vulnerability indicators, determined through the quintiles of the distribution, identified by different colors and the layer with the coverage area of health teams was superimposed on hatch pattern.

The coverage areas of health units with FHT were concentrated in the strata in which the indicator presented the highest scores (greater vulnerability). The first stratum, representing the least

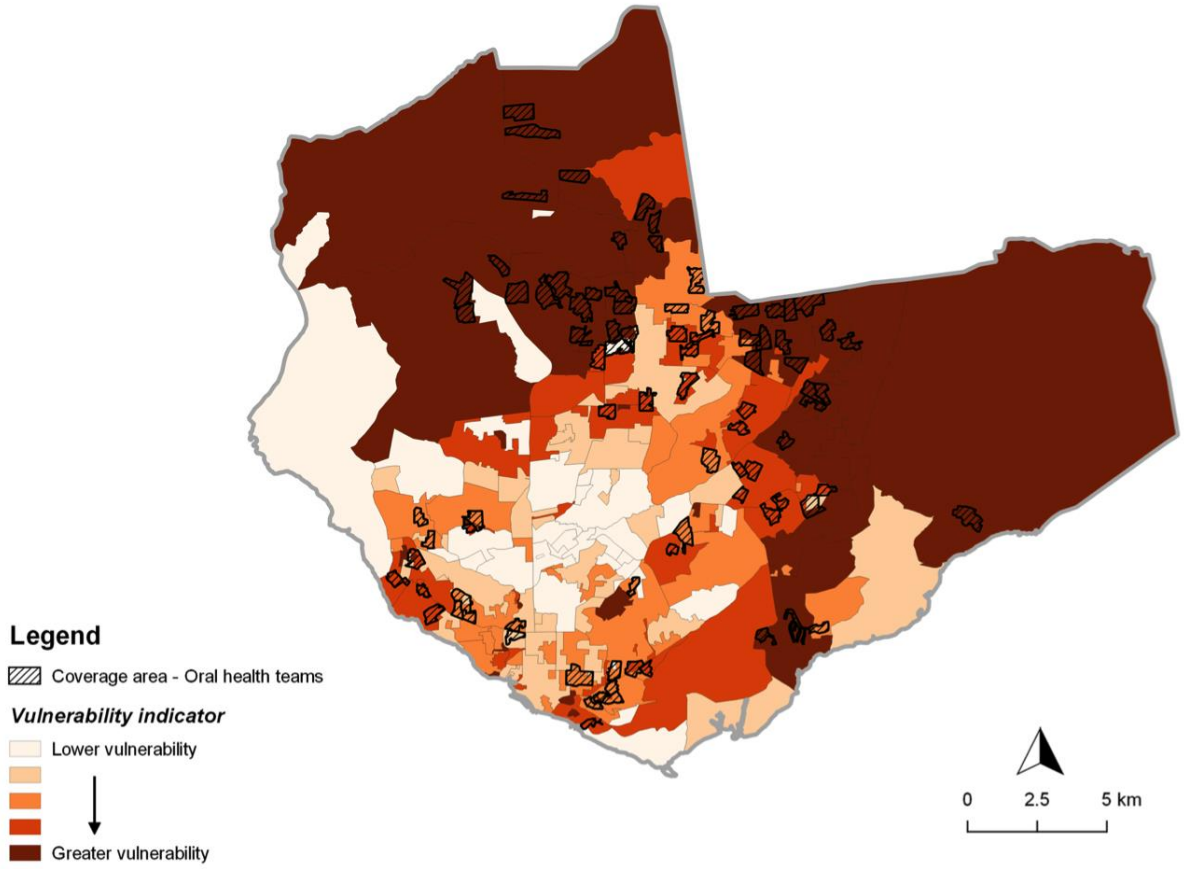
vulnerability, harbored only 0.7% of the territory covered by the teams. The second, the third and the fourth strata comprised 6.6%, 30.6% and 31.6% of FHT coverage, respectively. The HDUs that constituted the stratum of greater vulnerability contained 30.5% of the coverage (Figure 1).

Figure 1: Social vulnerability in the human development units and distribution of family health teams coverage areas, Manaus, Amazonas.



Oral health teams were also concentrated in the strata of greater vulnerability (Figure 2). The first and second strata comprised 1.1% and 2.3% of the covered territory, respectively. The third and the fourth strata concentrated 22.4% and 27% of the oral health coverage. Almost half of the territory covered by oral health teams (47.2%) was located in HDUs with the highest scores of the social vulnerability indicator, which means greater vulnerability.

Figure 2: Social vulnerability in the human development units and distribution of oral health teams coverage areas, Manaus, Amazonas.



Regarding the weighted indicator, it was observed that approximately one fourth of the total FHT coverage area (25.1%) was located in the HDUs that composed the first stratum and 7.1%, in the second stratum. Lower percentage coverage (3.3%) was found for the third stratum, and 9.3% of the territory coverage was located in the fourth stratum. The highest percentage of FHT territory coverage was located in HDUs that represented the most vulnerable stratum (55.2%) (Figure 3).

Figure 3: Weighted social vulnerability in the human development units and distribution of family health teams coverage areas, Manaus, Amazonas.

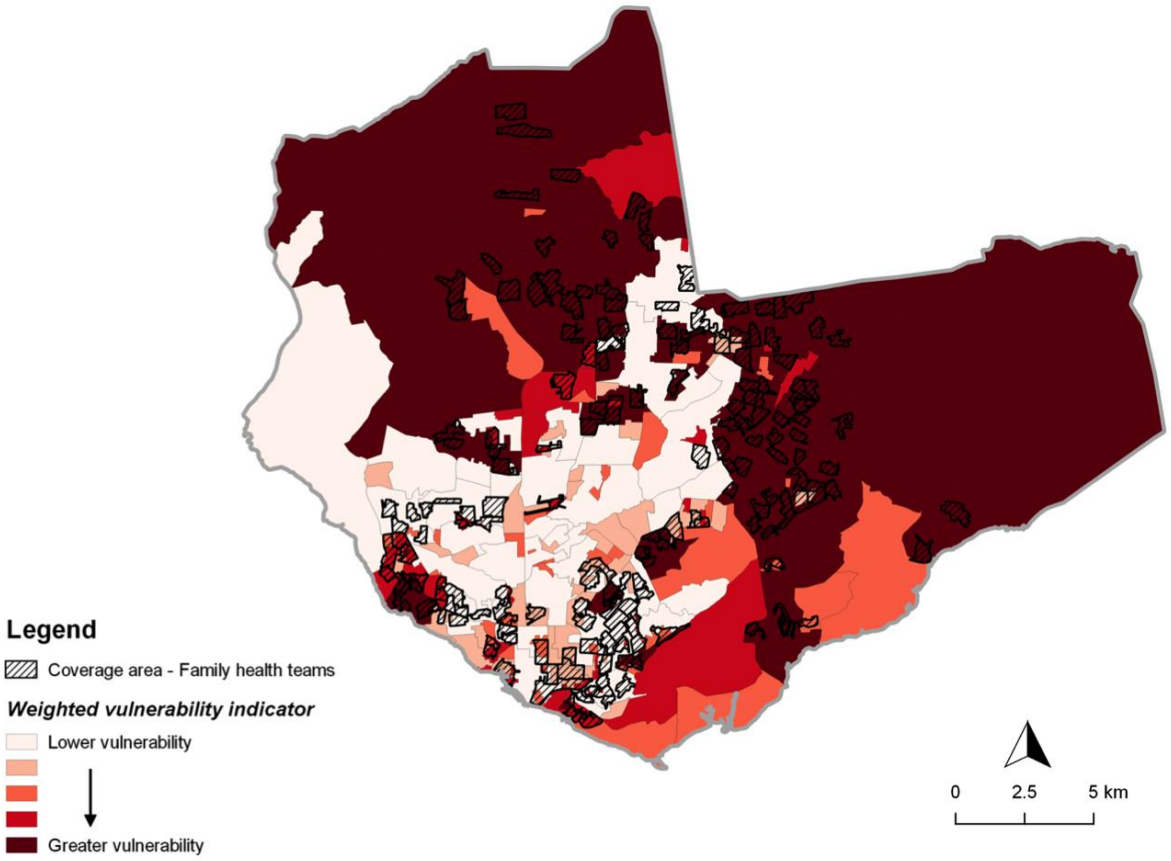
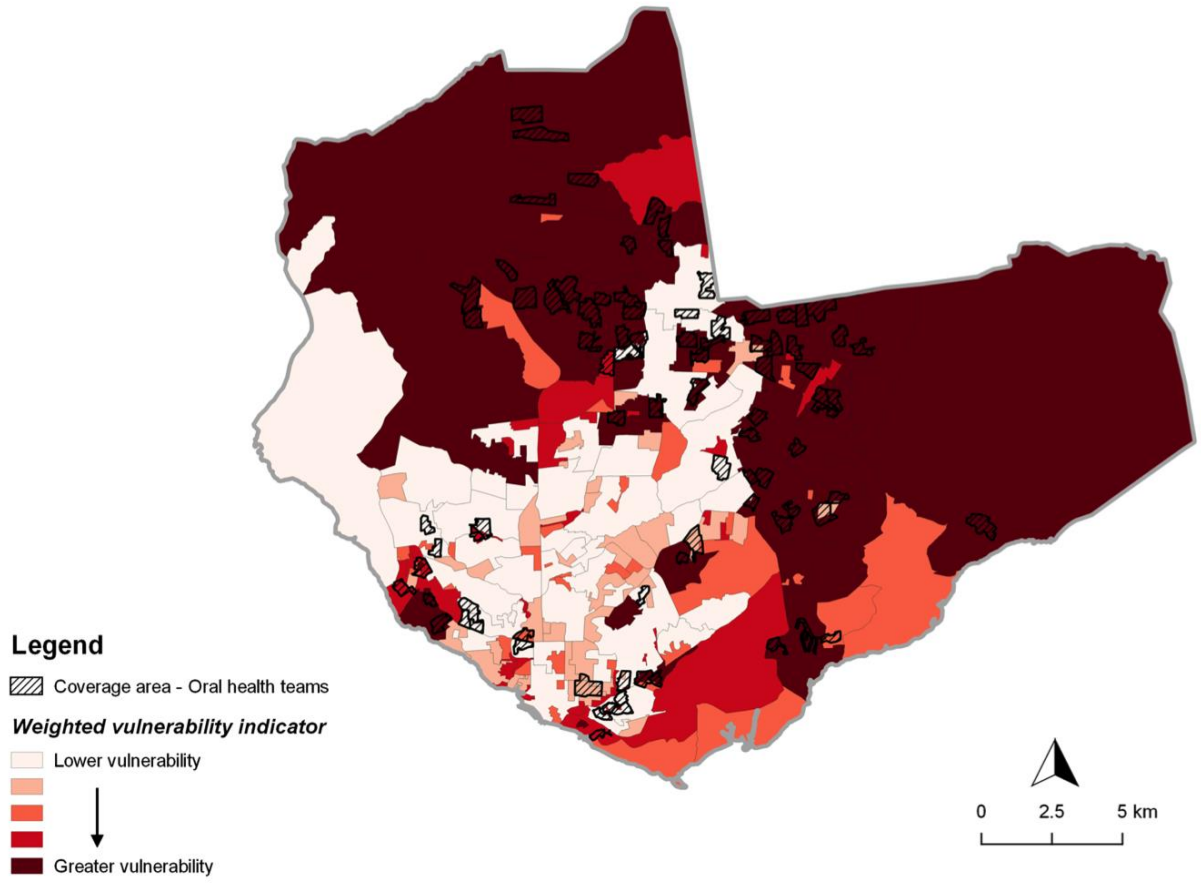


Figure 4 shows the distribution of oral health teams according to the weighted vulnerability indicator. The first stratum included 20.7% of the total area covered by the teams, corresponding to the second highest percentage. The second and third strata had the lowest coverage percentages (3.4% and 2.9%, respectively). The fourth stratum comprised 5.2% of the coverage and the highest percentage of coverage (67.8%) was located in the HDUs of greater social vulnerability, the fifth stratum.

Figure 4: Weighted social vulnerability in the human development units and distribution of oral health teams coverage areas, Manaus, Amazonas.



DISCUSSION

The analysis of the spatial distribution of health services in primary care considering the social characteristics of the territory showed that the health teams, including oral health teams, were concentrated in the areas of greater vulnerability of the municipality of Manaus, according to the proposed indexes. However, when considering the population size, despite the predominance of teams in areas of greater vulnerability and more populous, there was a significant increase of the teams in areas of lower weighted social vulnerability, to the detriment of the other intermediate strata.

The concentration of health teams observed in deprived areas seems to meet the equity in access to health services, considering the social inequalities. Besides impacting directly on health, the latter is also one of the factors that determine the chance one is admitted to the health care system. Organizing the primary care as the preferred gateway to the health system is an important strategy to promote equity in the delivery of services. Equity in access to health services aims to reduce differences and the interference of factors considered avoidable, and in a fair way, to compensate the inequalities in health, considered as a reflection of social inequalities (Consenza, 2002; Sawyer *et al.*, 2002; Lora, 2004; Goldbaum *et al.*, 2005).

To the authors' knowledge, there are no similar studies set in other locations in Brazil. Although territorial differences in accessibility between urban and rural areas have been described more

frequently (Mcgrail e Humphreys, 2015; Shiika *et al.*, 2015), the role of inequities within the urban areas of the municipalities is also recognized (Brown *et al.*, 2016). Vulnerability would be a proxy for the social inequalities, representing the conditions that contribute or indicate a greater susceptibility of individuals to health problems (Birch *et al.*, 1996; Todd *et al.*, 2015; Shah *et al.*, 2016).

Two indicators of social vulnerability were constructed based on primary indicators. Besides the reproducibility, spatial disaggregation, comparability, periodicity and reduced cost, the literature emphasizes the importance of using composite indicators, seeking a broader approach to social reality (Torres *et al.*, 2003; Luiz *et al.*, 2009). The literature suggests that indicators of social vulnerability can be used to guide the allocation of resources in primary care since they are strongly related to the health needs of the population. These measures would be more relevant for this purpose than others related to the utilization of services. The latter can be misled in areas with hindered access to health care and, consequently, less use of services (Sundquist *et al.*, 2003).

In addition to the context of social vulnerability, the distribution of the population is another relevant aspect to be considered when planning health actions and services. The approximation between services and vulnerable and populous regions should be prioritized, widening the geographical accessibility to the users, particularly in locations with low coverage of health services. The allocation or displacement of teams to strata three and four could ensure an even more equitable distribution of primary health care in the municipality.

Even though a trend towards equity in the distribution of health services has been observed in the municipality, the low availability of services with FHT, especially oral health teams, is remarkable. The most deprived stratum comprised the majority of FHT, but they are also characterized by low coverage of health services. These areas are populous and represent large territorial extensions, which means that access to health care is hindered to a huge part of the population, even considering the coverage of the traditional model of care that persists in part of the municipality.

A strategy initially used to evaluate diseases, the spatial analyses applied enabled the health teams' territorial distribution over different social areas was pictured. Acquiring information on georreferencing propitiates a concrete representation of territorial distribution of the constructs evaluated, namely health services and social vulnerability (Nardi *et al.*, 2013). This is especially relevant in locations with low service coverage, as it allows the identification of the spatial distribution of health inequities (Moreira *et al.*, 2007). When performing a geographical reference of health-disease process components (people, health services, health conditions and determinants), a sociospatial individual, and not only biological, is considered. Reordering the primary care based on the centered family care on the territorialization in health demands a greater understanding of the social aspects that act on the health-disease process for planning better the health interventions and actions (Lora, 2004).

The primary social indicators used derived from the 2010 demographic census. These are the most current intramunicipal data available. Although some time has passed, it is expected that findings were not affected once the changes on social status do not occur readily.

The adequate allocation of health services in primary care may also contribute to organize the healthcare network, including the other levels of care. It is suggested that there is a relationship between the lower availability of services in primary care and hospitalization due to preventable causes and the use of emergency services caused by conditions that should be addressed in primary care (Ceccon *et al.*, 2014; Fishman *et al.*, 2016).

The health teams, including oral health, were concentrated in the areas of greater social vulnerability in Manaus, Amazonas. Considering the social vulnerability when planning the healthcare delivery is a strategy to reduce barriers in access and benefit those with greater health needs accessing health care, therefore ensuring equity in access to services. Thus, it might contribute to health planning as it guides the rational use of available resources to reach the purpose of favoring the improvement of the populations' health and life conditions. Including the population distribution in the territory would allow an even more equitable allocation of services in terms of organizational accessibility.

REFERENCES

ANDERSEN, R. M. Revisiting the behavioral model and access to medical care: does it matter? **J. Health Soc. Behav.**, v. 36, n. 1, p. 1-10, Mar 1995. ISSN 0022-1465 (Print) 0022-1465.

ASSIS, M. M.; JESUS, W. L. Acesso aos serviços de saúde: abordagens, conceitos, políticas e modelo de análise. **Cien. Saude Colet.**, v. 17, n. 11, p. 2865-75, Nov 2012. ISSN 1413-8123. Disponível em: < http://www.scielo.br/pdf/csc/v17n11/v17n11a02.pdf >.

BARATA, R. B. Acesso e Uso de Serviços de Saúde: considerações sobre os resultados da pesquisa de condições de vida 2006. **Sao Paulo Perspec.**, v. 22, n. 2, p. 19-29, 2008.

BARATA, R. B. et al. Health inequalities based on ethnicity in individuals aged 15 to 64, Brazil, 1998. **Cad. Saude Publica**, v. 23, n. 2, p. 305-13, Feb 2007. ISSN 0102-311X (Print) 0102-311x. Disponível em: < http://www.scielo.br/pdf/csp/v23n2/06.pdf >.

BIRCH, S.; EYLES, J.; NEWBOLD, K. B. Proxies for healthcare need among populations: validation of alternatives--a study in Quebec. **J. Epidemiol. Community Health,** v. 50, n. 5, p. 564-9, Oct 1996. ISSN 0143-005X (Print) 0143-005x. Disponível em: < https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1060351/pdf/jepicomh00185-0090.pdf >.

BROWN, E. J. et al. Racial Disparities In Geographic Access To Primary Care In Philadelphia. **Health Aff. (Millwood)**, v. 35, n. 8, p. 1374-81, Aug 1 2016. ISSN 0278-2715.

CECCON, R. F.; MENEGHEL, S. N.; VIECILI, P. R. Hospitalization due to conditions sensitive to primary care and expansion of the Family Health Program in Brazil: an ecological study. **Rev. Bras. Epidemiol.**, v. 17, n. 4, p. 968-77, Dec 2014. ISSN 1415-790x.

CIRINO, S. et al. Avaliação de acessibilidade geográfica em sistemas de saúde hierarquizados usando o modelo de p-medianas: aplicação em Santa Catarina, Brasil. **Cad. Saude Publica,** v. 32, n. 4, p. e00172614, 2016. ISSN 0102-311x. Disponível em: < http://www.scielo.br/pdf/csp/v32n4/1678-4464-csp-32-04-e00172614.pdf >.

CONSENZA, G. W. **Distribuição espacial e acesso da população aos serviços de saúde**. 2002. 127 (MSc). Instituto de Medicina Social, Universidade do Estado do Rio de Janeiro, Rio de Janeiro.

FISHMAN, J.; MCLAFFERTY, S.; GALANTER, W. Does Spatial Access to Primary Care Affect Emergency Department Utilization for Nonemergent Conditions? **Health Serv. Res.**, Nov 17 2016. ISSN 0017-9124. Disponível em: < http://onlinelibrary.wiley.com/store/10.1111/1475-6773.12617/asset/hesr12617.pdf?v=1&t=jbpd58cy&s=cffdf01261aab52ef35d464b262c12f14f033372 >.

GOLDBAUM, M. et al. Utilização de serviços de saúde em áreas cobertas pelo programa saúde da família (Qualis) no municipio de São Paulo. **Rev. Saude Publica,** v. 39, n. 1, p. 90-9, Feb 2005. ISSN 0034-8910 (Print) 0034-8910.

LORA, A. P. **Acessibilidade aos serviços de saúde: estudo sobre o tema no enfoque da Saúde da Família no município de Pedreira - SP**. 2004. 101 (MSc). Faculdade de Ciências Médicas, Universidade Estadual de Campinas, Campinas, São Paulo.

LUIZ, O. C. et al. Diferenciais intermunicipais de condições de vida e saúde: construção de um indicador composto. **Rev. Saude Publica,** v. 43, n. 1, p. 115-22, Feb 2009. ISSN 0034-8910.

MCGRAIL, M. R.; HUMPHREYS, J. S. Spatial access disparities to primary health care in rural and remote Australia. **Geospat. Health,** v. 10, n. 2, p. 358, Nov 4 2015. ISSN 1827-1987. Disponível em: < http://www.geospatialhealth.net/index.php/gh/article/download/358/332 >.

MENDOZA-SASSI, R.; BERIA, J. U. Utilización de los servicios de salud: una revisión sistemática sobre los factores relacionados. **Cad. Saude Publica,** v. 17, n. 4, p. 819-32, Jul-Aug 2001. ISSN 0102-311X (Print) 0102-311x. Disponível em: < http://www.scielo.br/pdf/csp/v17n4/5288.pdf >.

MOREIRA, R. S.; NICO, L. S.; TOMITA, N. E. A relação entre o espaço e a saúde bucal coletiva: por uma epidemiologia georreferenciada. **Cien. Saude Colet.,** v. 12, n. 1, p. 275-84, Jan-Mar 2007. ISSN 1413-8123. Disponível em: < http://www.scielo.br/pdf/csc/v12n1/27.pdf >.

MUNOZ SANCHEZ, A. I.; BERTOLOZZI, M. R. Pode o conceito de vulnerabilidade apoiar a construção do conhecimento em Saúde Coletiva? **Cien. Saude Colet.,** v. 12, n. 2, p. 319-24, Mar-Apr 2007. ISSN 1413-8123. Disponível em: < http://www.scielo.br/pdf/csc/v12n2/a07v12n2.pdf >.

NARDI, S. M. T. et al. Geoprocessamento em Saúde Pública: fundamentos e aplicações. **Rev. Inst. Adolfo Lutz,** v. 72, n. 3, p. 185-191, 2013. https://doi.org/10.18241/0073-98552013721562

PAIM, J. S.; SILVA, L. M. V. Universalidade, integralidade, equidade e SUS. **BIS, Bol. Inst. Saúde,** v. 12, n. 2, p. 319-324, 2010.

SAWYER, D. O.; LEITE, I. D. C.; ALEXANDRINO, R. Perfis de utilização de serviços de saúde no Brasil. **Cien. Saude Colet.,** v. 7, p. 757-776, 2002. ISSN 1413-8123. Disponível em: < http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1413-81232002000400012&nrm=iso >.

SHAH, T. I.; BELL, S.; WILSON, K. Spatial Accessibility to Health Care Services: Identifying under-Serviced Neighbourhoods in Canadian Urban Areas. **PLoS One,** v. 11, n. 12, p. e0168208, 2016. ISSN 1932-6203. Disponível em: < https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5172578/pdf/pone.0168208.pdf >.

SHIIKA, Y.; KRUGER, E.; TENNANT, M. Rural and remote dental services shortages: filling the gaps through geo-spatial analysis evidence-based targeting. **HIM J.,** v. 44, n. 3, p. 39-44, 2015. ISSN 1833-3583.

SUNDQUIST, K. et al. Care Need Index, a useful tool for the distribution of primary health care resources. **J. Epidemiol. Community Health,** v. 57, n. 5, p. 347-52, May 2003. ISSN 0143-005X (Print) 0143-005x. Disponível em: < https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1732439/pdf/v057p00347.pdf >.

TODD, A. et al. Access all areas? An area-level analysis of accessibility to general practice and community pharmacy services in England by urbanity and social deprivation. **BMJ Open,** v. 5, n. 5, p. e007328, May 8 2015. ISSN 2044-6055. Disponível em: < https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4431167/pdf/bmjopen-2014-007328.pdf >.

TORRES, H. G.; FERREIRA, M. P.; DINI, N. P. Indicadores sociais: por que construir novos indicadores como o IPRS. **Sao Paulo Perspec.**, v. 17, p. 80-90, 2003. ISSN 0102-8839. Disponível em: < http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0102-88392003000300009&nrm=iso >.

TRAVASSOS, C. Equidade e o Sistema Único de Saúde: uma contribuição para debate. **Cad. Saude Publica,** v. 13, n. 2, p. 325-330, Apr 1997. ISSN 0102-311x.

TRAVASSOS, C.; MARTINS, M. Uma revisão sobre os conceitos de acesso e utilização de servicos de saúde. **Cad. Saude Publica,** v. 20 Suppl 2, p. S190-8, 2004. ISSN 0102-311X (Print) 0102-311x. Disponível em: < http://www.scielo.br/pdf/csp/v20s2/14.pdf >.